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DATE: April 2, 2004

Memo

TO: RHIC E-Coolers

FROM: Ady Hershcovitch

SUBJECT: **Minutes of the April 2, 2004 Meeting**

Present: Ilan Ben-Zvi, Andrew Burrill, Yury Eidelman (ORNL & BINP Novosibirsk, Russia), Alexei Fedotov, Michael Harrison, Ady Hershcovitch, Animesh Jain, Dmitry Kayran, Jorg Kewisch, Vladimir Litvinenko, Derek Lowenstein, William Mackay, Christoph Montag, Thomas Roser, Triveni Srinivasan-Rao, Dejan Trbojevic, Jie Wei, Jiawen Xia (Lanzhou China).

Topics discussed: Novosibirsk High Power Free Electron Laser, Superconducting Solenoid.

Novosibirsk High Power Free Electron Laser: Dmitry started the meeting with a presentation on the status of the Novosibirsk High Power FEL. That system contains operating devices that are similar (though at lower power) to what is needed for the ERL and the RHIC electron beam cooler, e.g., energy recovery LINAC, electron gun, and electron beam dump. Their RF system operates CW at 180 MHz with “normal” (non-superconducting) cavities (Q is 40,000). The system is absolutely stable longitudinally; in the transverse direction, it has a high current threshold for instabilities (1 Ampere for a single pass and 100 mA for 8 passes). The parameters that have been achieved are: electron beam energy 12 MeV, bunch length 0.1 nsec, average electron beam current 27 mA (1.5 nC/bunch), bunch rep rate 22.5 MHz, and normalized emittance 30 mm-mrad. Future plans are to raise the electron beam energy to 50 MeV, the current to 150 mA, and the rep rate to 90 MHz.

Ilan asked on whether the stability calculations were done numerically or analytically, and what limits the beam output; Dmitry replied stability analysis was analytically and the present output, which was designed for 50 mA is limited by the electron gun thermionic cathode. Dmitry did not know the answer to Ady's question regarding the type of cathode used. Ady commented that Gennadiy Kuznetsov from Novosibirsk has developed record setting thermionic cathodes. To Ilan and Vladimir questions regarding the emittance scaling with electron beam current, Dmitry replied that it drops to 10 mm-mrad for bunch charge of 100 pC. This scaling is very encouraging for the BNL planed ERL and RHIC electron beam cooler. Thomas asked on whether, the electron gun shown in this presentation can become our backup gun that the Machine Advisory Committee recommended for us to have. A discussion on this topic ensued following Thomas' question.

Superconducting Solenoid: to Thomas' question regarding the status of the superconducting solenoid R&D, Animesh replied that a hall probe measuring device was developed. It could be utilized in one week. In two weeks the mirrors could be used. The meeting ended with a discussion about the various solenoid options. Too many options are plausible. Vladimir commented that discussions in next Wednesday's meeting could narrow some of the choices. Ilan and Thomas concluded that the most viable options could be further discussed next Friday.